

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

**[0001]** The present invention relates to an antenna, and in particular to a tri-band antenna employed in a mobile electronic device.

### 2. Description of the Prior Art

**[0002]** U.S. Pat. No. 6,552,685, discloses a flat antenna comprising radiation elements, a first dielectric substrate and a back ground plate. The radiation elements are constituted of a conductive plate provided on the front face of the first dielectric substrate and the back ground plate is constituted of a conductive plate provided on the rear face of the first dielectric substrate. However, the radiation elements, the first dielectric substrate and the back ground plate are integrated to overlap each other and mounted into a mobile electronic device. When the mobile electronic device is vibrated or swayed, friction will be generated between the antenna and the mobile electronic device, which result in that the antenna is damaged and signals transmitted by the antenna is not steadily.

**[0003]** Hence, an improved antenna is desired to overcome the above-mentioned shortcomings of the existing antennas.

## BRIEF SUMMARY OF THE INVENTION

**[0004]** It is therefore an object of the present invention to provide an antenna which is securely mounted in a mobile electronic device and transmits signals

steadily.

**[0005]** In order to achieve the above object, an aspect of the present invention is an antenna comprising a radiating portion, a ground portion and a feed cable. The radiating portion comprises a printed circuit board(PCB), a radiating element and a mounting portion. The radiating element and the mounting portion are separately mounted on the same surface of the PCB. The ground portion has a metal plate and a coupling portion on surface of the metal plate. The coupling portion is connected with the mounting portion. The feed cable comprises an inner conductor connected with the radiating element and an outer conductor connected with the metal plate.

**[0006]** Other objects, advantages and novel features of the invention will become more apparent from the following detailed description of preferred embodiments when taken in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0007]** FIG. 1 is a perspective view of a radiating portion and a ground portion of an antenna according to a first embodiment of the present invention;

**[0008]** FIG. 2 is a perspective view of the antenna of FIG. 1 further including a feed cable assembled thereto; and

**[0009]** FIG. 3 is a perspective view of an antenna according to a second embodiment of the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

**[0010]** One embodiment of the present invention will now be described with

reference to the accompanying drawing.

**[0011]** Referring to Fig. 1 and Fig. 2, an antenna 1 comprises a radiating portion 3, a ground portion 2 and a feed cable 6. The radiating portion 3 comprises a printed circuit board (PCB) 31, a radiating element 32 and a mounting portion 33. The ground portion 2 has a metal plate 22 and a coupling portion 21 adhered on bottom surface 221 of the metal plate 22.

**[0012]** The mounting portion 33 is disposed close to a shorter edge on a surface 311 of the PCB 31. The radiating element 32 and the mounting portion 33 are separately mounted on the same surface 311 of the PCB 31. The radiating element 32 comprises a low-frequency portion 321 in center, a through hole 324 defined in one end of the low-frequency portion, a first high-frequency portion 322 extending from one side of the low-frequency portion 321 and a second high-frequency portion 323 extending from the other side of the low-frequency portion 321.

**[0013]** The metal plate 22 comprises an accessional hole 223 for filling solder material, a setting hole 224 for mounting the antenna 1 to a mobile electrical device (not shown) and an orientational hole 225 for limit of rotating. A coupling portion 21 is disposed close to a shorter edge on the bottom surface 221 and is soldered with the mounting portion 33. The coupling portion 21 is made of metallic material or soldering tin.

**[0014]** The feed cable 6 comprises an inner conductor 61 connected with edge of the through hole 324 of the radiating element 32 and an outer conductor 62 connected onto a top surface of the metal plate 22.

**[0015]** Also in a modified embodiment, the feed cable 6 can be disposed under

the metal plate 22 when the antenna 1 is used in different conditions.

**[0016]** Referring to FIG. 3, a through hole 324' is defined through a bottom surface 312 of the printed circuit board 31'. A conductive layer 325 is disposed on the bottom surface 312 with one end of the conductive layer 325 extending from the bottom surface 312 to the mounting portion 33' and electrically connects with a mounting portion 33'. An inner conductor 61' of a feed cable 6' is connected with edge of the through hole 324' and an outer conductor 62' is connected with the conductive layer 325.

**[0017]** A setting hole 224' and an orientational hole 225' of a metal plate 22' are respectively connect with a mobile electronic device. The metal plate 22' is disposed on one side of the printed circuit board 31'.

**[0018]** It is to be understood, however, that even though numerous, characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosed is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.